



Sacramento Municipal Utility District SMUD's Green Power Program – Sale of Biogas to an Electric Utility

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Ruth MacDougall - SMUD
916-732-6625 - rmacdou@smud.org

Background on SMUD

- Sixth Largest Publicly-Owned Electric Utility
- Serve about 1.5 million people - City & County of Sacramento
- Seven Elected Board Members
- Public Values and Low Rates



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Leader in Renewable Energy

■ Renowned Solar Energy Program

- 10 MW of Photovoltaic (PV)
- 50% utility scale, and 50% distributed energy
- Over 900 PV systems connected at customer sites

■ SMUD's Renewable Portfolio Standard (RPS)

- Acquire 12% our electricity from renewable sources by 2006 and 23% by 2011, including Greenergy

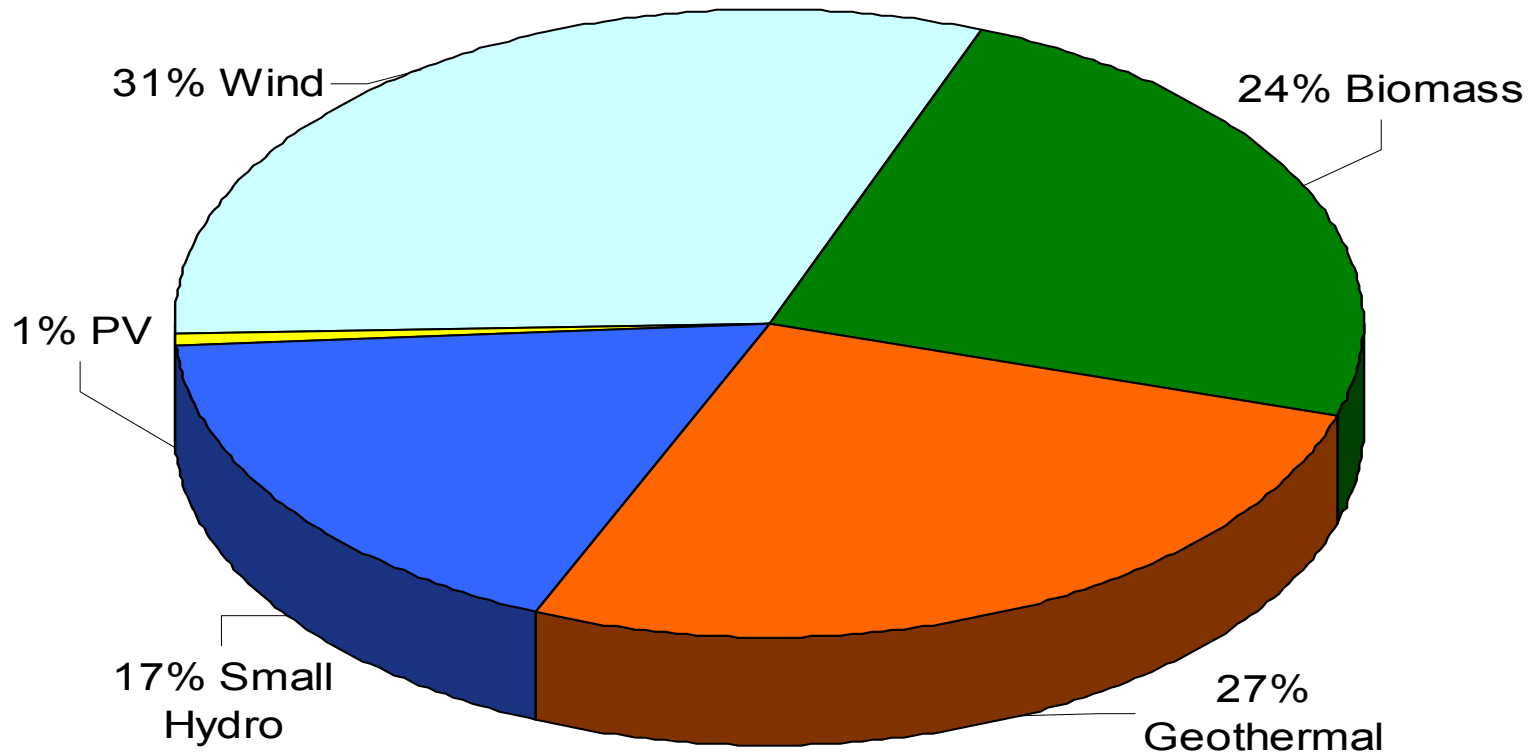


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Biomass an Important Part of SMUD's Renewables Mix



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Biomass Program Goals

- Biomass Program Goal
 - Convert problem wastes & residues to energy while providing environmental and economic benefits to our customers
- Biomass Program Activities
 - Dairy Digesters contribute to RPS, but are more for local benefits

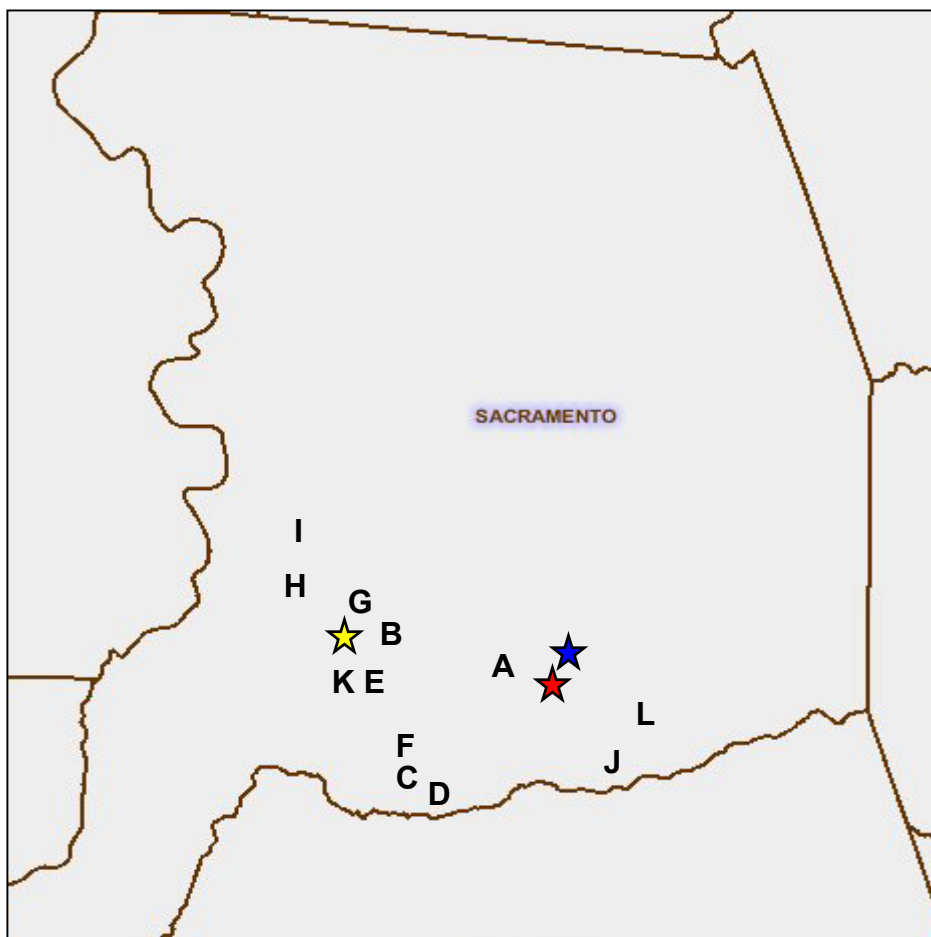


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Sacramento County Dairies



Total Cows in Top 15 out of 43 Dairies

★ – 1435
A – 1075
★ – 1020
B – 953
★ – 837
C – 745
D – 728
E – 693
F – 589
G – 563
H – 520
I – 468
J – 468
K – 451
L – 399



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Benefits of Dairy Digesters



■ Benefits to the Dairy Operator

- Reduce odor and flies
- Reduce air emissions of methane and volatile organic compounds (VOCs)
- Reduce risk of groundwater contamination
- Sustainable fuel supply
- Mature technologies with proven track record
- Produces fiber for bedding and sale to others
- Cost effective for the dairy business, with subsidies



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Pilot Dairy Digester Program

- SMUD offered incentives to largest 11 dairies
 - 13% funding incentives to augment 25% funding from USDA Rural Development
- Four proposals were submitted by our dairies and three were awarded
- Completion of digesters is expected in late 2006
 - Elk Grove – 186 kW will produce 1,466,000 kWh / year
 - Galt #1 – 92 kW will produce 725,000 kWh / year
 - Galt #2 – 77 kW will produce 609,000 kWh / year

Dairy Digester Incentive Program

- Provide incentive payments of 13% of all eligible project costs for USDA funded digester projects
- Instituted a new (2005) Biomass Net Metering Rate for facilities <1 MW
 - Net metering at retail rate for energy used at entire facility (with all meters added together)
 - ‘Hybrid’ net metering / purchase agreement for energy in excess of facility usage

Biomass Generator Credit (Summer Bill)				
Fictitious Dairy with 10 Accounts on Aggregated Bill				
Net Energy @ Account 1				
Bi-directional Consumption	from SMUD	0	kWh	
Bi-directional Generation	to SMUD	(140,680)	kWh	
		(140,680)	kWh	
Less Usage this Month		73,550	kWh	
Excess Generation	to SMUD	67,130	kWh	
Account	Rate	KWh	SMUD Bill	
1	ASN	-	\$	5.00
2	ASD	26,800	\$	2,376.16
3	ASD	10,100	\$	895.49
4	GSN	1,270	\$	14.49
5	NLGT	80	\$	19.23
6	RSC	1,390	\$	175.81
7	RSC	1,600	\$	202.38
8	ASN	2,070	\$	218.54
9	ASD	14,900	\$	1,321.07
10	ASD	15,340	\$	1,360.08
Total:		73,550		\$ 6,588.25
Net Generation Credit				
		ASN Summer Energy Rate		
73,550	KWh @	-\$0.09880	per KWh	(\$7,266.74)
Tax Adjustments				
	County Tax	(\$7,266.74)	@ 2.5%	(\$181.67)
	State Surcharge	-73,550	kWh x \$0.00022	\$ (16.18)
Excess Generation Power Purchase Credit				
		Power Purchase Price		
67,130	KWh @	-\$0.05800	per KWh	(\$3,893.54)
Total Bill (Check from SMUD to Dairy)				\$ (4,769.88)

■ Simplified billing process

Meter generation.

Net out total kWh from all bills.

Calculate excess power purchase.

Either pay or bill the customer.



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Cost and Payback Analysis



Type of Digester	Capital Cost (\$)	Estimated Payback w/o Incentives (Yrs)	Total Cost to Dairy After Incentives (\$)	Estimated Payback with Incentives (Yrs) *
Ambient Covered Lagoon	793,129	7.1	396,565	4.4
Heated, Complete Mix, Covered Lagoon	820,724	6.3	410,362	3.3
Ambient Covered Lagoon	607,392	9.5	380,272	5.9
Ambient Covered Lagoon	450,866	7.3	290,422	4.7

***Additional funding reduced this payback**



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Environmental Benefits – Reduction of VOCs and Greenhouse Gases

Location of Dairy	Number of Animals	*Total VOC Reduction (Tons/year)	**Methane Reduction (Tons/Year)	CO2 Equivalent (Ton/Year)
Elk Grove (w/ food waste)	1,435	8	859	18,898
Galt #1	1,020	6	328	7,216
Galt #2	1,100	7	419	9,218
TOTAL	3,555	20	1,606	35,332
<p>*Based on SMAQMD Title V Emissions estimate; <i>VOC reduction from dairy planning addition of food waste is based on manure only</i></p> <p>**Assuming the biogas produced contains 60% methane</p>				



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Value of Financial Incentives, Tax Breaks, and Credits

- SMUD acquires all environmental attributes of the energy in exchange for a high rate of compensation, including carbon credits and greenhouse gas (GHG) credits
- Dairy retains financial credits such as the Production Tax Credit (PTC) and depreciation
- SMUD will facilitate interconnection – ‘sit down at the table’ with the dairy and the digester vendor

Dairy Digester Interconnection Process

- SMUD review and approval of a completed 'Rule 21' application form and other necessary data
- SMUD receipt (or waiver) of all applicable fees
- Execution of an Interconnection Agreement with SMUD
- Installation of a generator output meter
- Field inspection and approval of the completed installation (with testing of non-cert. equipment)
- Written "**Authorization to Operate**" in parallel prior to the unit's full operation

What Causes Delays in Process

- 
- Incorrect information on application
 - Insufficient copies, missing one-lines, diagrams, site plans, and protection settings
 - Changes in projects such as new contractors, contact persons, phone numbers, e-mail addresses, as well as changes in design, and equipment, cause delays in processing
 - Significant changes can require a new application




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Typical Interconnection Process

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- Most interconnections at SMUD go smoothly
 - Design changes are not much of an issue when SMUD is notified early
 - Certified equipment (inverters, disconnect switches) greatly simplifies the process
 - Must be a certified AC disconnect accessible to utility personnel 24/7
 - Must be lockable and provide a visible open, usually installed within 10' of revenue meter



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Technical & Regulatory Challenges

- Environmental permitting is lengthy process in California because regulatory agencies in midst of developing new rules
- Engine technology improvement needed
 - Small engines produce NOx and gas cleanup methods are not always cost effective or safe
 - Larger low-NOx engines built in Europe need to be demonstrated in U.S.

Summary

■ Dairy Digesters Provide Public Good

- Protect economic viability of our agricultural sector
- Attract federal funding to our region
- Help dairies become better neighbors to encroaching suburbia
- Encourage locally produced renewable energy
- Mitigate methane (GHG) and VOC emissions
- Lead by example other anaerobic digestion projects, such as food waste, municipal solid wastes



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